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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/505,438	08/24/2004	Tetsuro Asano	492322017400	2447

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EXAMINER	
MAI, ANH D	

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 09/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/505,438	ASANO ET AL.	
	Examiner	Art Unit	
	Anh D. Mai	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 June 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *20-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6/01/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

A.M

DETAILED ACTION

Status of the Claims

1. The Amendment filed June 01, 2006 has been entered. Claims 20, 33, 39-42 have been amended. Claims 20-42 are pending.

Terminal Disclaimer

2. The terminal disclaimer filed on June 1, 2006 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent No. 6,914280 and 6,946,891 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Specification

3. The Applicant indicates that an amendment to the specification has been submitted, however, **none** was found.

4. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

For example: page 4, line 14, "diffusion in a substrate 201", the correct portion should be -- diffusion in a substrate 101 --.

5. First line of the specification must contain status information of the current application and the priorities.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 20-38 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There does not appear to be a written description of the claim limitation "the inner side surface of the first high concentration region **overlaps at least partially** with an inner side surface of the second high concentration region so that the portion of the insulating region is disposed between the inner side surfaces" in the application as filed.

Applicant asserts that the support for such limitation is disclosed at page 11, lines 12-25 and Fig. 5.

However, Fig. 5 as well as the written text shows that the first and second high concentration 201 and 202 do not overlap, not even partially.

7. Claims 32, 37 and 39-42 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the

relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

With respect to claims 32 and 37, there does not appear to be a written description of the claim limitation "a distance between the outer side surface of the first high concentration impurity region (claim 32) or between a side surface of the branch portion (claim 37) and an edge of the insulating region closest to the first high concentration impurity region is 10 μm or larger." in the application as filed.

As seen in Fig. 23A, the outer side surface of the first high concentration impurity region has been defined in claim 20 to be the side other than the one that faces the second impurity region. Claim 20 also defined that the first impurity region is formed in an insulating region.

Therefore, the distance between the side surface of the branch portion or the outer side surface of the first high concentration impurity region and the edge of the insulating region closest to the first high concentration impurity region is the interface between them, thus, 0 μm not 10 μm or larger.

With respect to claims 39-42, there does not appear to be a written description of the claim limitation "a distance in the direction of the flow (claims 39 and 40) or **normal** to the flow (claims 41 and 42) of electric current between the first high concentration impurity region and an edge of the insulating region closest to the first high concentration impurity region is 10 μm or larger." in the application as filed.

The flow of electric current is from the first high concentration impurity region to the second high concentration impurity region.

The term "direction normal to the flow" means perpendicular to the flow or from the top of the insulating region into the bottom.

The term "between the *first* high concentration impurity region and an **edge** of the insulating region *closest to the first* high concentration impurity region" is the interface between the two, which is 0 μm, since the interface has no thickness.

Applicant must remove or provide support for the new matter in response to the Office Action.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 32, 37 and 39-42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 32 and 37, both claims recite similar subject matter: wherein the distance between outer side surface of the first high concentration impurity region (claim 32) or a side surface of the branch portion (claim 37) and an edge of the insulating region closest to the branch portion is 10 μm or larger (both claims).

As discussed above, the interface has no thickness.

Secondly, the claimed limitation is not understood.

With respect to claims 39-42, claims 39-42 recite the limitation: "a distance in the direction of the flow or normal to the flow, of electric current between the first high

concentration impurity region and an edge of the insulating region closest to the first high concentration impurity region is 10 μm or larger".

The limitation is not understood, thus indefinite.

The merits of these claims (37 and 39-42) therefore could not be determined.

9. Claims 20-38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 20 recites: the inner side surface of the first high concentration region **overlaps at least partially** with an inner side surface of the second high concentration region **so that the portion of the insulating region is disposed between the inner side surfaces**.

If two regions are deem overlap then nothing is between them. Therefore, the claims are indefinite.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 20, 24-31, 34, 36 and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Asano et al. (U.S. Pub. No. 2002/0047177) as previously applied.

As best understood by the examiner, Asano teaches a protecting element as claimed including:

a first high concentration impurity region (161) formed in an insulating region (145) of a substrate (151) and connected to a first terminal (162) of an element formed in the substrate; and

a second high concentration impurity region (160) formed in the insulating region (145) and connected to a second terminal (170) of the element, the first (161) and second (160) high concentration impurity regions facing each other with a portion of the insulating region (145) disposed therebetween,

wherein a width of the first high concentration impurity region (161) is configured so that upon discharging of electrostatic energy applied between the first (162) and second (170) terminals a current path is formed in the insulating region (145) from an outer side surface of the first high concentration impurity region (161) to the second high concentration impurity region (160), the outer side surface of the first high concentration impurity region (161) being opposite from an inner side surface of the first high concentration impurity region that faces the portion of the insulating region (145). (See Figs. 3, 18A-C).

Regarding the functional limitation of: "the width of the high concentration impurity region is configured so that upon discharging of electrostatic energy applied between the first and second terminals a current path is formed in the insulating region from an outer side surface of the first high concentration impurity region to the second high concentration impurity region", since the protecting element of Asano comprises the exact same elements as that of the claim, thus the element of Asano should inherently function the same way.

With respect to claim 22, the width of the second high concentration impurity region (160) of Asano is configured so that upon the discharging of the electrostatic energy applied between the first (162) and second (170) terminals the current path from the outer side surface of the first high concentration impurity region (161) inherently reaches an outer side surface of the second high concentration impurity region (160), the outer side surface of the second high concentration impurity region (160) being opposite from an inner side surface of the second high concentration impurity region that faces the portion of the insulating region (145). (See Figs. 3, 18A-C).

With respect to claim 24, the separation of the first (161) and second (160) high concentration impurity regions of Asano is 10 μm or smaller.

With respect to claim 25, the separation of the first (161) and second (160) high concentration impurity regions of Asano is 4 μm or larger.

With respect to claim 26, impurity concentration of the insulating region (145) of Asano is 1×10^{14} cm-3 or lower.

With respect to claim 27, volume resistivity of the insulating region (145) of Asano is 1×10^{3} Ω.cm or higher.

With respect to claim 28, the insulating region (145) of Asano is configured to provide an additional current path upon the discharging between the inner side surface of the first high concentration impurity region (161) and an inner side surface of the second high concentration

impurity region (160) and between bottom surfaces of the first (161) and second (160) high concentration impurity regions.

With respect to claim 29, the first high concentration impurity region (161) of Asano comprises a branch portion that does not face the second high concentration impurity region (160) and is configured to provide upon the discharging an additional current path in the insulating region (145) between the branch portion and the second high concentration impurity region (160). (See Figs. 3, 18C).

With respect to claim 30, the current path of Asano inherently has a higher conductivity modulation than the additional current path.

With respect to claim 31, a current running through the current path of Asano upon the discharging is inherently greater than a current running through the additional current path upon the discharging.

With respect to claim 34, the current path of Asano inherently expands when the electrostatic energy applied between the first (162) and second (170) terminals becomes larger.

With respect to claim 36, the additional current path of Asano inherently has a higher conductivity modulation than the current path.

With respect to claim 38, the additional current path of Asano inherently expands when the electrostatic energy applied between the first and second terminals becomes larger.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 21, 23, 33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Asano '177.

With respect to claims 21 and 23, Asano teaches a protecting device as described in claim 20 and 22 above, thus, Asano is shown to teach all the features of the claim with the exception of the specific width of the first (161) and second (160) high concentration impurity region.

Note that the claimed range does not appear to be critical.

However, Asano further teaches that the first (161) and second (160) high concentration impurity region can be made smaller such that the insulating region 145 is located directly under the pad electrode 170 and wiring layer 162 consequently, the leakage of the high frequency signal applied to the pad to the wiring layer through the insulating region 145 is prevented.

Note that the specification contains no disclosure of either the *critical nature of the claimed width of the first and second impurity region* of any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Within purview of one having ordinary skill in the art, it would have been obvious to determine the optimum width of the impurity regions to prevent leakage of high frequency signal applied to the electrodes. See In re Aller, Lacey and Hall (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine

Furthermore, it would have been obvious to one having ordinary skill in the art at the time of invention to reducing the size of the impurity regions of Asano since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose,* 105 USPQ 237 (CCPA 1955).

With respect to claim 33, Asano is shown to teach all the features of the claim with the exception of explicitly disclosing the thickness as claimed. Note that, the claimed thickness range of 20 μm or larger appears to be common.

However, Asano teaches that a buffer layer of 6000 Å thickness has already prevent leakage.

Note that the specification contains no disclosure of either the *critical nature of the claimed thickness of 20 μm or larger of the insulating portion under the impurity region* of any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to form the protecting device of Asano on a thicker insulating layer to prevent leakage.

With respect to claim 35, the capacitance between the first (161) and second (160) high concentration impurity regions of Asano is propos ional to the volume resistivity of the insulating region between them. Since the insulating region (145) of Asano has a volume resistivity within the claimed range $1x10^3$ Ω.cm or higher, thus, meets the capacitance of 40 fF or smaller, and the element of Asano inherently has a strength against electrostatic discharge at least 10 times as large as that of the element *without* the first and second high concentration impurity regions.

Response to Arguments

12. Applicant's arguments filed June 1, 2006 have been fully considered but they are not persuasive.

Rejection under 35 U.S.C 112, first paragraph and second paragraph

With respect to claims 32, the independent claim 20 recites: "a first high concentration region formed in an insulating region of a substrate".

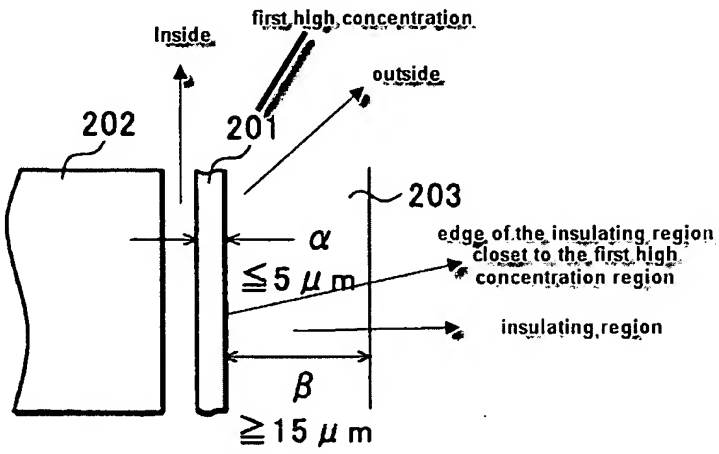
By being formed "in" the insulating region, both or all sides of the first high concentration region contact the insulating region.

Claim 32 recites: wherein a *distance* between the *outer side surface* of the first high concentration impurity region and an edge of the insulating region closest to the first high concentration impurity region is 10 μm or larger. (emphasis added).

As illustrates in Fig. 21B below, the outer side surface of the first high concentration impurity region 201 contacts the insulating region 203, therefore, **the edge** is the interface

between the insulating region 203 and impurity region 201, thus there is no distance or the distance is a lot less than 10 μm. The similar also applies to claims 37 and 39-42.

FIG.21B



With respect to claim 20, as seen above, there is no overlap between the impurity regions 210 and 202.

Conclusion

13. Although the same reference is applied, however, the amendment has resulted in new rejection.

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (571) 272-1710. The examiner can normally be reached on 8:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).